Code: 9A01803

B.Tech IV Year II Semester (R09) Regular Examinations, March/April 2013
ADVANCED FOUNDATION ENGINEERING
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Answer any FIVE questions.
All questions carry equal marks.

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1   Write down the Terzaghi's general equation for computing ultimate bearing capacity of soils below footings. Clarify the basis and assumptions mode in its derivation.

2   With an suitable example discuss the effects eccentric and inclined loadings, and also explain effects of local shear failures.

3   Explain step by step procedure to analyse and design of RCC combined footings.

4   (a) Describe the various purposes for which the pile foundations are taken.
    (b) A pile $0.3m \times 0.3m$ penetrates a deposit of soft clay with $c = 50 KN/m^2$, for 13 m length and rests on a deposit of sand. Determine how much load is taken up by skin friction.

5   (a) Explain with neat sketches shapes of well foundation and component parts.
    (b) Derive formulae for maximum scour depth, minimum grip length and ultimate safe bearing capacity of a well foundation.

6   (a) Discuss the stability computations for bukle heads.
    (b) What are the different bracing systems for braced cuts and describe them?

7   (a) What are the factors influencing swell pressure of soil?
    (b) Explain sand cusion technique and heave in expansive soils.

8   (a) Describe the procedure of construction of an under reamed pile with a neat sketch.
    (b) Explain functioning of under reamed pile.

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1 (a) Explain clearly Meyerhof's theory of bearing capacity.
   (b) Explain local shear and general shear failures and their identification.

2 (a) Differentiate between ultimate, netultimate and safe bearing capacities. Why we need these?
   (b) Explain effect of high water table on ultimate bearing capacity.

3 Explain step by step procedure to analyse and structural design of strap footings.

4 (a) What are dynamic formulas? What are their limitations?
   (b) A 300 mm diameter, 6 m long piles are used as foundations for a column carries 700 kN, in a uniformly of normally consolidated clay having $\gamma_{sat} = 19\ KN/m^3$, liquid limit = 40%, void ratio = 1.05. There are nine piles on a group arranged in square centre to centre spacing is 500 mm. Hard strate at 7 m. Estimate settlement of pile group.

5 Explain well foundations and its elements, with neat sketch and also listout various forces acting on a well foundation.

6 (a) Explain free earth support method of determining the embedment depth of anchored sheet pile wall.
   (b) A cantilever sheet pile wall retain cohesion less soil for a height of 5m. The water table is at a depth of 3m below the top of the wall, $\gamma = 18\ KN/m^3$, $\gamma_{sat} = 20KN/m^3$ $\phi = 30^o$, determine depth of embedment for the sheet pile.

7 (a) Explain the principle and execution of lime column technique.
   (b) What are the tests to determine the swell pressure of an expansive soil and explain any two of them?

8 (a) What are the under reamed piles? Under what conditions they are suitable and what are the limitations of under reamed piles.
   (b) Explain the action of pile groups in:
       (i) Sands   (ii) Clays.

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1 (a) Express ultimate bearing capacity of soils in terms of Terzaghi's bearing capacity factors.
   (b) A strip footing is 1.5m wide and its base rests on 1m below the ground surface. If the soil below the ground level is dense with $c = 100 \; KN/m^2$, and $\phi = 38^o$, determine the ultimate bearing capacity, assume unit weight of soil = $20 \; KN/m^2$.

2   Explain:
   (a) Button's theory.
   (b) Siva Reddy analysis.

3 (a) Describe the standard field test on soil to determine its safe bearing capacity.
   (b) A square footing is required to carry a net load of 1200 kN. Determine the size of the footing if the depth of foundation is 2m and factor of safety = 3, the soil is sandy with N = 12. Water table is very deep.

4 (a) What is negative skin friction? How is it estimated?
   (b) Write short note on under reamed piles.

5   Explain the following:
   (a) Types of caissons.
   (b) Sinking of wells.

6   Write short notes on:
   (a) Types of sheet piles.
   (b) Fixed earth support method.
   (c) Forces in structs.

7   Write a short note on:
   (a) Identification of expansive soils.
   (b) Swell pressure and swell potential.
   (c) CNS technique.

8 (a) Describe the procedure of construction of an under-reamed pile with a neat sketch.
   (b) Briefly explain various problems associated with expansive soils in civil engineering.

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(Civil Engineering)

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1 (a) Explain with neat sketches the general shear failure below a strip footing have a smooth base.
   (b) Distinguish between safe bearing capacity and allowable soil pressure. Show by simplified analytical approach the effect of width of footing, on the bearing capacity of footing on sands.

2   Differentiate between initial settlement and consolidation settlement. Bringout clearly where do you expect each of them to occur.

3 (a) How the proportioning of strap footing is done?
   (b) A square footing for a square column is 2.5m×2.5m and carries, a load of 2000KN. Compute the factor of safety available against, overturning, sliding and bearing capacity failure, if the soil below the footing has strength value $c = 50\ KN/m^2$, $\phi = 15^o$, $\gamma = 17.6 KN/m^3$, depth of foundation = 1.5m, $N_c = 12.5$, $N_q = 4.5$, and $N_\gamma = 2.5$.

4   Explain how settlement of piles is estimated in (a) sands (b) clays.

5 (a) What are the preventions for minimising tilts and shifts during well sinking?
   (b) Under what situations a well foundation is preferred over a pile foundation.
   (c) Enumarate the various forces which act on a foundation well.

6   The height of cantilever sheet pile from the top of dredge level is 9m. The water level in the back fill is at 2m from top. Find the depth of penetration required for factor of safety equal to '1'. Assume that above the water table, the soil is dry, the other properties of soil are, $\gamma_{sat} = 20 KN/m^3$, $K_A = 0.33$, $K_P = 3.0$, $G_S = 2.6$.

7   Write short notes on:
   (a) Activity.
   (b) Problems associated with black cotton soils.
   (c) Granular piles.

8   A pile load test gave the following data. Plot the load settlement curve and determine allowable load with a factor of safety '3'.

Load in KN	100	200	300	400	500	600
Settlement in 'mm'	3	6	9	13	19	27

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